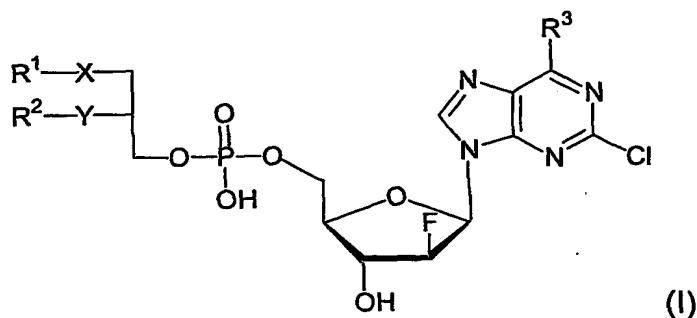


Claims

## 1. A nucleotide derivative of formula I



wherein

$R^1$  is selected from the group consisting of a straight-chain or branched, saturated or unsaturated alkyl chain having 1-20 carbon atoms, which is unsubstituted or substituted at least once by halogen,  $C_1-C_6$  alkoxy,  $C_1-C_6$  alkylmercapto,  $C_1-C_6$  alkoxy carbonyl,  $C_1-C_6$  alkylsulfinyl or  $C_1-C_6$  alkylsulfonyl groups;

$R^2$  is selected from the group consisting of hydrogen, a straight-chain or branched, saturated or unsaturated alkyl chain having 1-20 carbon atoms, which is unsubstituted or substituted at least once by halogen,  $C_1-C_6$  alkoxy,  $C_1-C_6$  alkylmercapto,  $C_1-C_6$  alkoxy carbonyl or  $C_1-C_6$  alkylsulfonyl groups;

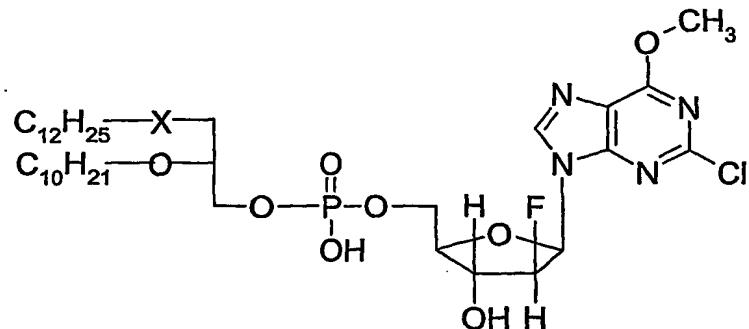
$R^3$  is amino or  $OR^4$ , wherein  $R^4$  is  $C_1-C_8$  alkyl;

$X$  is selected from the group consisting of a sulfur atom, a sulfinyl group and a sulfonyl group;

Y is oxygen;

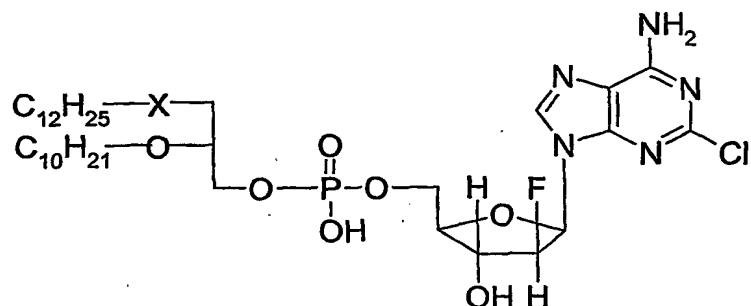
whereby when R<sup>3</sup> is amino, said amino group may be unsubstituted or substituted by a known amino protecting group, their tautomers, their optically active forms and racemic mixtures, and their physiologically acceptable salts of inorganic and organic acids or bases.

2. The nucleotide derivative according to claim 1, wherein R<sup>1</sup> is a straight-chain C<sub>8</sub>-C<sub>15</sub> alkyl group, which is unsubstituted or substituted by a C<sub>1</sub>-C<sub>6</sub> alkoxy or a C<sub>1</sub>-C<sub>6</sub> alkylmercapto group.
3. The nucleotide derivative according to claim 1, wherein R<sup>2</sup> represents a straight-chain C<sub>8</sub>-C<sub>15</sub> alkyl group, which is unsubstituted or substituted by a C<sub>1</sub>-C<sub>6</sub> alkoxy or a C<sub>1</sub>-C<sub>6</sub> alkylmercapto group.
4. The nucleotide derivative according to claims 1 to 3, wherein R<sup>3</sup> is OCH<sub>3</sub>.
5. The nucleotide derivative according the claims 1-4, wherein the compound is:



wherein X is sulfur, sulfinyl or sulfonyl.

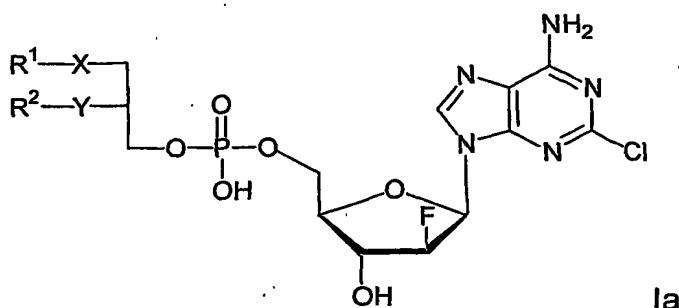
6. The nucleotide derivative according to claims 1 to 3, wherein R<sup>3</sup> is NH<sub>2</sub>.
7. The nucleotide derivative according to claims 1 to 3 or 6, wherein the compound is:



wherein X is sulfur, sulfinyl or sulfonyl.

8. A pharmaceutical composition comprising at least one compound according to claims 1 - 7 in combination with a pharmaceutically acceptable adjuvant or vehicle.
9. A method for treating malignant tumors comprising administering to a patient in need of such treatment an amount of a compound according to claims 1 - 7 effective to treat said tumors.
10. The method according to claim 9, wherein said tumor is selected from the group consisting of carcinomas, sarcomas or leukemias.
11. A method for treating malignant tumors comprising administering to a patient in need of such treatment an amount of the composition according to claim 8 effective to treat said tumors in fixed or free combination with other anticancer agents.

12. A method of synthesis of compounds of the formula Ia:



wherein R<sup>1</sup> is a straight-chain or branched, saturated or unsaturated alkyl residue having 1-20 carbon atoms, optionally mono- or polysubstituted by halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, C<sub>1</sub>-C<sub>6</sub> alkylmercapto, C<sub>1</sub>-C<sub>6</sub> alkoxy carbonyl, C<sub>1</sub>-C<sub>6</sub> alkylsulfinyl or C<sub>1</sub>-C<sub>6</sub> alkylsulfonyl groups;

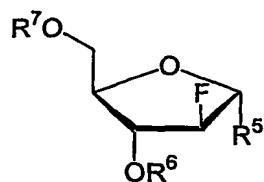
R<sup>2</sup> is hydrogen, a straight-chain or branched, saturated or unsaturated alkyl chain having 1-20 carbon atoms, optionally mono- or polysubstituted by halogen, C<sub>1</sub>-C<sub>6</sub> alkoxy, C<sub>1</sub>-C<sub>6</sub> alkylmercapto, C<sub>1</sub>-C<sub>6</sub> alkoxy carbonyl or C<sub>1</sub>-C<sub>6</sub> alkylsulfonyl groups;

X is selected from the group consisting of a sulfur atom, a sulfinyl group and a sulfonyl group;

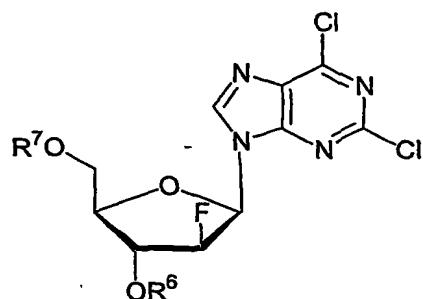
Y is oxygen;

comprising:

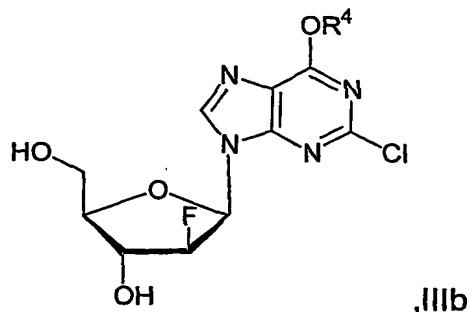
(a) reacting 2,6-dichloroadenine with an arabinofuranosyl derivative of the formula:



wherein R<sup>5</sup> is bromo or chloro and R<sup>6</sup> and R<sup>7</sup> are protecting groups, in the presence of a hindered potassium base and a solvent to form the dichloropurine nucleoside derivative:

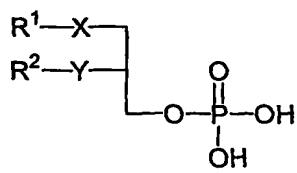


(b) subjecting said dichloro purine nucleoside derivative to conditions to provide for deprotection and an aromatic nucleophilic substitution reaction to provide the 6-alkoxy-2-chloro purine nucleoside derivative of general formula IIIb:

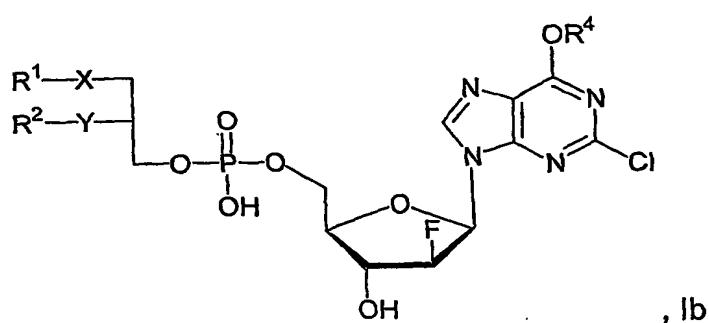


wherein R<sup>4</sup> is C<sub>1</sub>-C<sub>8</sub> alkyl;

(c) reacting said 6-alkoxy-2-chloro purine nucleoside derivative with an activated form of the compound:

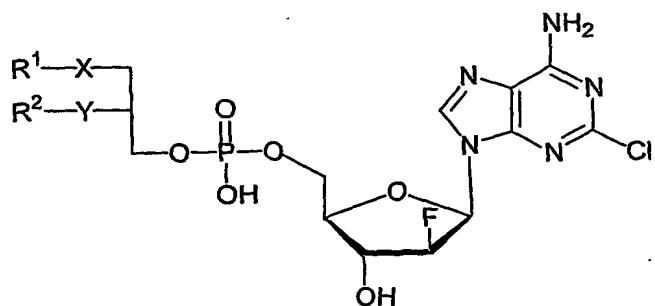


in an inert solvent to provide the conjugated 6-alkoxy-2-chloro purine nucleotide derivative of general formula Ib:



, Ib

(d) subjecting said conjugated 6-alkoxy-2-chloro purine nucleotide derivative to conditions that provide for aminolysis to prepare the conjugated 2-chloroadenine derivative:



13. The method of claim 12 wherein, said hindered potassium base is potassium *t*-butoxide or potassium *t*-amylate.
14. The method of claim 12, wherein said solvent for reacting said 2,6-dichloroadenine and said arabinofuranosyl derivative is a mixture of acetonitrile, *t*-butanol and 1,2-dichloroethane.
15. The method of claim 12, wherein R<sup>4</sup> is methyl.

16. The method of claim 12, wherein R<sup>5</sup> is bromo.
17. The method of claim 12, wherein R<sup>6</sup> and R<sup>7</sup> are independently acetyl or benzoyl.
18. The method of claim 12, wherein R<sup>1</sup> and R<sup>2</sup> are individually a straight-chain C<sub>8</sub>-C<sub>15</sub> alkyl group, which is unsubstituted or substituted by a C<sub>1</sub>-C<sub>6</sub> alkoxy or a C<sub>1</sub>-C<sub>6</sub> alkylmercapto group.
19. The method of claim 12, wherein R<sup>1</sup> is C<sub>12</sub>H<sub>25</sub> and R<sup>2</sup> is C<sub>10</sub>H<sub>21</sub>.